# 7. Hydrology

Setting

## Drainage

Stormwater drainage has been the subject of three studies focusing on areas in and around Auburn:

"The Dairy Road Watershed Master Plan," by $CH_2M$ Hill, September, 1992.
"Old Town Drainage Study for City of Auburn," California, by Aqua Resources, Inc., November, 1989.
"Auburn/Bowman Community Plan Hydrology Study," by James M. Montgomery Consulting Engineers, Inc., July, 1992.

The areas evaluated in each of these studies are shown in Figure 7-1. As shown, the "Auburn/Bowman Community Plan Hydrology Study" encompassed both the City and its Sphere of Influence. However, the study did not evaluate flooding potential within three drainage basins (AU1A, AU1B, and AU2A) which are located inside of the Auburn City Limits (see Figure 7-1). Most of the area in these three basins is evaluated by the "Dairy Road Watershed Master Plan" (AU1A and AU1B) and the "Old Town Drainage Study" (AU2A).

**Drainage within City Limits.** The Dairy Road and Old Town watersheds represent those areas within the City Limits with the most potential for drainage problems to occur (Richard Guillen, Public Works Director, Personal Communication, 1/20/93). The area west of the Dairy Road Watershed, and north of Old Town, is not part of the Master Plan. However, because of development along Nevada Street, major drainage improvements have been constructed in the past through a Drainage Reimbursement District and individual project improvements ("Nevada Street Rezoning EIR," Planning Concepts, October, 1990, p. 67).

The extent of existing flooding in the Dairy Road watershed was determined through questionnaire responses from area residents and confirmed through computer modelling. Mapping of flood prone areas from the Master Plan is shown on the Existing and Potential Flooding Map (Figure 7-2). The majority of the flooding problems are identified by the Plan as occurring on lower Dairy Road and on Auburn Ravine Road from Palm Avenue up past Dairy Road. The flooding has reportedly affected roads and bridges but not residences ("Dairy Road Master Plan," p. 3). The 27 bridges and culverts affected are listed in Table 7-3 (p. 7-14).

Repeated flooding of the Old Town area is documented in the "Old Town Drainage Study" (section 1.0 following plate 2). The Old Town area is shown on the Existing and Potential Flooding Map (Figure 7-2). Stormwater from three drainage basins flow into the Old Town area: the Brewery Basin, the Lower Lincoln Basin, and the Upper Lincoln Basin. The 165 acre Brewery Basin includes the west half of the Fairgrounds and the Skyline Subdivision and Racetrack Street area. The 110 acre lower Lincoln Basin

{This page intentionally left blank}

includes the east half of the Fairgrounds and parts of the Old Town area. The 315 acre Upper Lincoln Basin includes most of the City's commercial area and the High School. The Brewery drainage combines with that of the Lincoln Way Basins in an underground culvert beneath the boardwalk at the intersection of Washington and Sacramento Streets. The combined flows are carried in a covered channel and concrete box culvert before being discharged into an open channel, near I-80; 100-year flows at this location are 750 cubic feet per second.

This Old Town drainage system is inadequate to carry the 10 year stormflow. Principal limitations to the system are the Lincoln Way and Brewery Lane feeder culverts and the "Old Town Drainage Study" recommends three alternatives for providing 100-year storm drainage capacity.

**Drainage in the Sphere of Influence.** The following watersheds, described in the Auburn/Bowman Community Plan Hydrology Study are partially or entirely contained within the proposed Sphere of Influence:

The Dry Creek watershed is located south of the Orr Creek watershed and also drains water from east to west across the study area. Approximately 1.7 square miles of the Dry Creek watershed is located outside the study area to the north and east. Rock Creek, a major tributary to Dry Creek, drains approximately 4.3 square miles in the southern portion of the watershed. Dry Creek and Orr Creek meet approximately 2000 feet outside the western boundary of the study area to from Coon Creek.

Auburn Ravine is located in the southern portion of the study area with the head waters primarily located within the City of Auburn. The upper portion of Auburn Ravine drains most of Auburn with a flow pattern to the south and west. North Ravine is a primary tributary to Auburn Ravine and drains the western portion of the Auburn Ravine watershed that is located in the study area. North Ravine generally drains water from north to south and the confluence with Auburn Ravine is located outside the study area approximately one mile from the western boundary.

The very northern portion of the study area is drained by a portion of the Bear River watershed. This area consists primarily of small unnamed tributaries that drain water north directly into the Bear River. The very eastern portion of the study area is drained by the American River watershed. As with the Bear River, this portion of the study area consists primarily of small, short drainages which flow directly into the North Fork of the American River. The exception to this is Clipper Creek which drains approximately five square miles outside the study area and then drains into the North Fork within the study Area boundaries.

Headwaters of Mormon Ravine and Dutch Ravine watersheds are located in the very southern portion of the study area. The general drainage pattern is to the south for Mormon Ravine and to the west for Dutch Ravine. In addition, the headwaters for Deadman's Canyon are also located within the western portion of the study area adjacent to the Dry Creek and Auburn Ravine watersheds. Deadman's Canyon flows into Coon Creek approximately two miles outside the study area boundary.

The following is a summary of the known existing problem areas due to flooding. It should be noted that this list may not be conclusive and does not include areas of local flooding not attributed to stream flow. It is also possible that more bridges and culverts were overtopped than are included in this list, but do not pose a hazard or cause damage to the structure and have not been reported to the County.

Dry Creek Watershed
Bowman Road Bridge at Dry Creek
Dry Creek Road adjacent to Dry Creek
Dry Creek Road and Haines Road at Dry Creek
Bell Road Bridge at Dry Creek
Blue Grass Road at Dry Creek
Twin Pines Trail at Dry Creek
Howe Road at Dry Creek
Hubbard Road at Dry Creek Tributary

Rock Creek Watershed
Sherwood Way at Rock Creek
Highway 49 Bridge at Rock Creek
Joeger Road at Rock Creek
Richardson Road at Rock Creek
Rock Creek Road at Rock Creek
New Airport Road at Rock Creek
New Airport Road at Rock Creek Tributary

Orr Creek Waterhsed
Christian Valley Road at Orr Creek
West Stanley Drive at Orr Creek
Lone Star at Orr Creek Tributary

North Ravine Watershed
Vada Ranch Road at North Ravine
Calnick Lane at North Ravine
Warren Way at North Ravine
Millertown Road at North Ravine
Mt. Vernon Road at North Ravine
Harris Road at North Ravine
Vista Road at North Ravine
Kemper Road at North Ravine
Millertown Road at North Ravine Tributary
Mt. Vernon Road at North Ravine Tributary
Bar Ranch Road at North Ravine Tributary

Auburn Ravine Watershed
Stonehouse Road and Forgotten Road at Auburn Ravine

The results of the hydrologic computer modelling (HEC-1 and DEC-2) conducted as part of the study indicates that flooding currently occurs at approximately 30 locations (see Figure 7-2).

**Water Quality within City Limits.** The City of Auburn contains a mix of older urban areas and new suburban sites and the quality of runoff is expected to vary accordingly. Most of these waters mix in the drainages of the Auburn Ravine watershed and have an effect on downstream natural reaches of the Auburn Ravine Creek. Water quality in this Creek is also influenced by discharges from the City of Auburn Sewage Treatment Plant.

The Auburn Wastewater Treatment Plant Facility Expansion Master Plan EIR (February 1992), contains the following description of existing water quality in Auburn Ravine Creek (pp. 3-10 and 3-11):

> Water quality data for Auburn Ravine Creek are shown in Table 3-2. The three sampling locations are downstream of the treatment facility. Sites #2 and #3 are west (i.e., downstream) of Lincoln.
>
> Ten water parameters were measured at the three sites during August and September 1987. Five water samples were analyzed from the Clark Ranch and four samples from the Brewer Road and Catlett Road locations. Analysis was accomplished using Hach titration and colorimetric kits which, although not of EPA required quality, have proven to provide reliable and stable results. Very little change was observed between testing dates in this study. The sample sites were chosen to provide (1) a section where Auburn Ravine Creek fall is good and insects are observed, (2) where fall is less and the water slightly turbid, and (3) where water is milky and the terrain flat.
>
> Results of the water analysis in this study are compared to similar studies made on Sierra Nevada and northeastern U.S. freestone streams. The parameters measured and a description of their analysis are described below.

**TABLE 3-2**

**AUBURN RAVINE CREEK WATER QUALITY**
**SAMPLES TAKEN AUGUST-SEPTEMBER 1987**
**(Average of All Samples Taken)**

| Water Parameter | Site #1 | Site #2 | Site #3 |
|---|---|---|---|
| Depth | -4" | 0 | 0 |
| Turbidity | None | V. Slight | Milky |
| Temperature | 64° F. | 67° F. | 68° F. |
| pH | 7.0 | 7.3 | 7.3 |
| Ammonia Nitrogen | 0.6 mg/l | 0.4 mg/l | 0.8 mg/l |
| Dissolved Oxygen | 10 mg/l | 10 mg/l | 6 mg/l |
| Carbon Dioxide | 5 mg/l | 5 mg/l | 26 mg/l |
| Total Acidity | 9 mg/l | 10 mg/l | 36 mg/l |
| Total Alkalinity | 23 mg/l | 65 mg/l | 150 mg/l |
| Hardness | 34 mg/l | 77 mg/l | 155 mg/l |

Site Locations

1. Clark Ranch at Bridge Lane (5 samples).
2. Brewer Road Crossing (4 samples).
3. Catlett Road Crossing (4 samples).

- Depth. An arbitrary measure comparing steam flows to the date of the first sample. Although water was falling slightly during the study at Site 1, little impact was observed at other sites.

- Turbidity. Again, an arbitrary, observed measure estimating the clearness of the water, stream bottom visibility and off-color nature. Site 3 had milky and quite turbid water during the entire study. In viewing the terrain and the water, it was quite obvious that the stream flow was largely composed of irrigation run-off water. Although Site 2 was slightly off-color, little change was observed during the study at other sites.

- Temperature. Although average temperatures above 60° F. are somewhat warm for salmon, steelhead and trout, the stream was at its probable worst condition of late summer, low water flow and did provide habitable water.

- pH. Measured both with a pH meter and by the colorimetric method. No remarkable readings observed.

- Ammonia Nitrogen. a rough measure of possible domestic pollution. No wide variation between sites but readings were higher than expected. Further fecal and coliform bacteria tests should be made.

- Dissolved Oxygen. Readings were good at Sites 1 and 2. Site 3 had noticeably lower readings but not below survival rate.

- Carbon Dioxide. Again, Sites 1 and 2 were most satisfactory. Site 3, however, has sufficiently high readings to be cause for concern.

- Total Acidity (Phenolphthalein). Slightly higher at Site 3 but not dangerously so.

- Alkalinity. Somewhat low at Sites 1 and 2 for good support of aquatic life (however good insect life observed).

- Hardness. Water is quite hard (i.e., is high in dissolved minerals) at Site 3.

**Water Quality in the Sphere of Influence.** The Auburn/Bowman Community Plan Hydrology Study provides the following description of existing water quality in the unincorporated area surrounding the City, including the Sphere of Influence (pp. 4-1 and 4-2):

**Streams.** As discussed in previous sections, the primary streams in the study area are Orr Creek, Dry Creek, Rock Creek, North Ravine and Auburn Ravine. The watersheds of these five streams comprise over 75% of the Auburn/Bowman Community Plan area with the remaining portions of the study area draining to the Bear River, American River (North Fork), and other smaller stream systems. The water quality in all of these streams is of concern for wildlife and fisheries as well as for other downstream uses. Stormwater runoff from rural and urban areas may contain excessive levels of pollutants (ie. pesticides, herbicides, hydrocarbons, etc.) that are toxic to fisheries and other aquatic life in the streams. In addition, the water which drains from the Auburn/Bowman Community Plan area eventually reaches the Sacramento River which is a primary source of water for the City of Sacramento as well as for the Sacramento - San Joaquin Delta. This water is put to numerous uses including water supply, recreation, fisheries and wildlife habitats.

**Reservoirs.** The potential impacts of stormwater runoff on the reservoirs in the study area is also of concern. Reservoirs in the study area include Halsey Forebay and Afterbay, Orr Creek Reservoir, Dry Creek Reservoir, Wise Forebay, and Rock Creek Lake. These reservoirs are primarily used as regulating points for the numerous canals in the study area. However, Rock Creek Lake is also a primary source of municipal water for Nevada Irrigation District's water treatment plant located adjacent to the lake. The watershed upstream of Rock Creek Lake is undergoing significant urbanization, and therefore the impacts of stormwater runoff from recent and planned developments are of special concern.

In addition to potential pollutants such as metals, hydrocarbons and pesticides, pollutants in the form of soluble nutrients (nitrogen and phosphorous) may also have a significant impact on the water quality of reservoirs in the study area. Excessive nutrient loading may promote eutrophication (algae blooms) in these reservoirs which can have an adverse impact on both the aquatic habitat as well as the overall water quality. Algae blooms often lead to anoxic conditions which can impact fisheries and many of the aquatic organisms. In addition anoxic conditions can promote the release of soluble metals from bottom sediments and under these conditions, metals such as iron, manganese, and mercury may enter the water column at toxic levels.

**Canals.** Stormwater runoff may also enter directly into the canals in the study area. As discussed in previous sections, most of the canals in the Auburn/Bowman Community Plan area are not encased and, therefore, have the potential for intercepting and transporting stormwater runoff and associated pollutants. Hence, as with streams and reservoirs, any contaminant in the stormwater runoff has the potential for entering the canal system. The canals in the study area primarily supply water for agricultural use and power generation; however, the canal water is also used for domestic purposes (after home treatment) in some rural areas. In addition, the Wise Canal supplies Rock Creek Lake which, along with the Combie-Ophir Canal, is the primary source of water for NID's water treatment plant at Rock Creek Lake.

**Groundwater Quantities and Quality.** Rural residential uses in the northern and western portion of the planning area generally depend on groundwater for domestic needs. Groundwater in sufficient quantities to supply domestic requirements occurs only along open fractures within metamorphic and granitic rock units. Terrace deposits are of insufficient occurrence to provide a significant groundwater supply, although there may be a few water wells producing from these surficial deposits along Dry Creek.

The sedimentary rock unit is of insufficient extent to provide a groundwater resource in this area. Permeability is very low because of high cementation of particles. The volcanic rock unit is impermeable and contains no groundwater. Surface water does penetrate to the underlying conglomerate along open vertical joints that occur within this mudflow.

The predominant rock type in the planning areas is metamorphic. The depth at which groundwater flows occur in metamorphic rock varies significantly. About 25% of domestic wells are completed at less than 90 feet and 75% at less than 160 feet. The fact that significant flows are reported for a few wells (less than 10%), at depths greater than 160 feet, indicates that there is a reason for drilling deeper when the occurrence of additional water has been predicted and the need is sufficiently high. The average production figure reported is 14-15 gallons per minute (gpm).

There is also a significant amount of granitic rock in the plan area. The most common depth intervals at which ground water is encountered in the granitic rocks are 60- to 70-feet. The average production for granitic rock well within the planning area is 9- to 10-gpm.

In general, well water in the area is of moderate to high quality. The only problem areas encountered have been in serpentine rock where groundwater can be salty and brackish.

## Impact Evaluation Criteria

The following are Goals and Policies from the current General Plan (Auburn Area General Plan, 1978) related to hydrology.

**Table 7-1**
**AUBURN AREA GENERAL PLAN**
**HYDROLOGY RELATED GOALS, POLICIES, IMPLEMENTATION MEASURES**

**Environmental Resources Management Element**

**Goal 2: Protect the high quality of air and water resources consistent with adopted federal, state and local standards.**

Policies

1. Continue to monitor and control existing land uses that could deteriorate air and water quality.

2. Review proposed developments for their potential adverse affect on air and water quality.

contd.

3. Pursue adoption of a Grading Ordinance in the Auburn area which would include protection against sedimentation and soil erosion.

4. Encourage application of measures to mitigate erosion and water pollution from earth disturbing activities such as land and road construction.

**Safety Element**

**Goal 2: Protect the lives and property of the citizens of the Auburn Area from unacceptable risk resulting from flood hazards.**

Policies

1. Continue to work closely with the U.S. Army corps of Engineers in defining existing and potential flood problem areas.

2. Maintain natural conditions within the 100-year floodplain of all streams.

3. Continue to implement zoning policies which minimize potential loss of property and threat to human life caused by flooding.

At the state level, the California Regional Water Quality Control Board has a general policy of non-degradation for all receiving waters. Its general objectives for inland surface waters include:

- The suspended sediment load and sediment discharge rate to surface waters shall not be altered in such a manner as to cause nuisance or adversely effect beneficial uses;
- Waters shall not contain suspended material in concentrations that cause nuisance or adversely effect beneficial uses.

Additionally, according to Appendix G of the CEQA Guidelines, a project will normally have a significant effect on the environment if it will, among other things:

(f) substantially degrade water quality;
(g) Contaminate a public water supply;
(h) substantially degrade or deplete groundwater resources;
(i) Interfere substantially with groundwater recharge:
. . .
(q) Cause substantial flooding, erosion or siltation;

Note: Only the hydrology-related impacts of the list are included here.

The federal water quality criterion that applies to sediment is expressed for solids and turbidity (USEPA, 1976). The criterion was established for fish and aquatic life, stating that the ". . . should not reduce the depth of compensation point for photosynthetic activity by more than 100 percent from the seasonally established norm for aquatic life." Basically, this mean

that sediments should not cloud the water and reduce light penetration for photosynthesis more than 10%.

According to the EPA (1976) standards, the maximum allowable concentration of oil and grease in domestic water supply is "Virtually free from oil and grease . . . ." The EPA standard for oil and grease with respect to aquatic life is not to exceed 0.01 times the lowest continuous flow which results in a 50% lethal concentration in 96 hours to important freshwater species. This criteria must be established in a laboratory for individual species. This criteria must be established in a laboratory for individual species and a particular chemical constituent. For example, lethal toxicity for freshwater fish is 39 mg/l for waste oil.

Impacts

1. **Increased stormflows and flooding.** As described in the Setting section, there are three studies which provide information on the flooding conditions: the "Dairy Road Watershed Master Plan," the "Old Town Drainage Study," and the "Auburn/Bowman Community Plan Hydrology Study. "

The "Dairy Road Watershed Master Plan" projects future flooding conditions based on the land use designations of the current Auburn Area General Plan (adopted in 1978). The future uses on vacant parcels are shown to be low- and medium-density residential; this is generally consistent with the designations in this area for the proposed plan.

The "Old Town Drainage Study" is also based upon buildout of the land use designations of the current Auburn Area General Plan. In general, the future land uses of the existing and proposed plans do not vary substantially in type or intensity in the Old Town watershed.

The "Auburn/Bowman Hydrology Study" bases it flooding projections upon the land use designations of the Draft Community Plan, which are substantially different in the Sphere of Influence than the designations of the Draft Auburn General Plan. Because the available studies for the Sphere of Influence are not based precisely on the Draft Auburn General Plan designations, the numerical values quantifying the extent by which the capacities of bridges and culverts are exceeded are not used in this impact analysis. Instead, the analysis identifies potential flooding locations and planned solutions.

**Flooding within City Limits** ~ As shown in Table 7-3, development permitted under the general plan has the potential, without offsetting practices, to worsen flooding at 27 locations and create flooding at four more locations in the Dairy Road Watershed. The Dairy Road Master Plan notes that flooding depths will increase by approximately 0.5 foot if stormflows from future development is not mitigated (page ii). Additionally, permitted development could aggravate existing flooding conditions in the Old Town area.

The General Plan policies intended to offset these potential impacts are listed in Table 7-2 below.

**Table 7-2**
**DRAFT AUBURN GENERAL PLAN**
**GOALS, POLICIES & IMPLEMENTATION MEASURES**
**RELATED TO FLOOD CONTROL**

**Circulation Element**

**Goal 5 Provide a full range of adequate public services for all area residents and businesses.**

Policy

5.1 The City shall prepare and maintain a five-year capital improvement program for public facilities.

5.2 The City shall seek new and maintain existing sources of funding to develop, operate and maintain community facilities, urban services and transportation facilities. (LU9.1)

**Safety Element**

**Goal 2 Protect the lives and property of the citizens of the Auburn area from unacceptable risk resulting from flood hazards.**

Policy

2.1 Encourage future development in areas identified as having low risk of flooding.

2.2 Prohibit development within 100-year floodplain of all streams.

2.3 Continue to implement regulatory policies which minimize potential loss of property and threat to human life caused by flooding.

**Implementation Measures**

C. The City shall identify high flood risk areas and update the zoning ordinance to prohibit development in flood prone areas.

Responsibility: Community Development, Public Works
Time Frame: 1993
Related Policy: 2.1, 2.2, 2.3

Tab -3

## BRIDGE AND CULVERT OVERTOPPING LOCATIONS IN THE DAIRY ROAD WATERSHED, CITY OF AUBURN

| Watershed | Existing Flooding Worsened by Future Dev (100 yr event) | Flooding Created by Future Dev (100 yr event) | Watershed | Existing Flooding Worsened by Future Dev (100 yr event) | Flooding Created by Future Dev (100 yr event) |
|---|---|---|---|---|---|
| **Boardman Ranch** | | | | | |
| 6022 Palm Ave Bridge | | ✓ | 11670 Bridge 50 ft SW of Mulberry Ln | | ✓ |
| 7036 Church Rd Bridge | ✓ | | 11730 Bridge across Auburn Ravine Rd at Mulberry Ln | ✓ | |
| 8012 Bridge 50 ft No. of Marguerite Mine Rd | ✓ | | 12045 150 ft SW of Nation Dr | ✓ | |
| 8136 Bridge 180 ft No. of Marguerite Mine Rd | ✓ | | 12159 Bridge 50 ft SW of Nation Dr | ✓ | |
| 8685 Bridge 150 ft No. of Dairy Rd | | ✓ | 12240 Bridge at Nation Dr | ✓ | |
| 9180 Arch Culvert across from Mikkelsen Ct | ✓ | | **Dairy Ranch Branch** | | |
| 9254 Bridge Crossing Auburn Ravine Rd 300 ft NE of Dairy Rd | ✓ | | 8575 Culvert at Dairy Rd | ✓ | |
| 9489 Culvert under McCloud Ct | ✓ | | 8820 Culvert 200 ft N of Auburn Ravine Rd | ✓ | |
| 9818 Bridge 300 ft SE of Granite Ln | ✓ | | 9150 Bridge 200 ft S of Vick Ct | ✓ | |
| 9912 Bridge 200 ft SW of Granite Ln | ✓ | | 9650 Culvert 300 ft N of Vick Ct | ✓ | |
| 10014 Bridge at Granite Ln | ✓ | | 9900 Culverts 500 ft n of Vick Ct | ✓ | |
| 10383 Culvert at Wooded Wy | ✓ | | 10202 Bridge 350 ft S of Patricia Wy | ✓ | |
| 10567 Culverts at Vidal Ln | ✓ | | 10516 Culvert 50 ft S of Eckard Wy | ✓ | |
| 10727 Culvert at Applan Wy | ✓ | | 11215 Bridge at Incline Rd | | ✓ |
| 10837 Boardman Diversion #1 | ✓ | | 12290 Culverts at Dairy Ln | ✓ | |
| 10899 Bridge at Oak Tree Dr | ✓ | | 12815 Culvert 500 ft S of Luther Rd | ✓ | |

SOURCE: Adapted from the Dairy Road Watershed Drainage Master Plan, Tables 2 (p.14) and 5 (p.21).

The Circulation Goal and Policies are general and do not provide any details on how flooding impacts can be avoided. The Safety Element Goals, Policies, and Implementation Measures are directed toward preventing exposure of new residents to flooding, but do not address the worsening of existing flooding problems. or the exposure of increased numbers of people to flood hazards. The following General Plan text provides more of an explanation of the City's approach to flooding problems (pp. v-53 to v-54):

> Auburn's drainage system is currently at capacity. Each new development that adds impervious surfaces has the potential to impact Auburn's drainage system. In the past, the City has required that projects retain storm drainage on site. This method prevented any net increase in drainage flows to the different drainage basins. As the City grows and expands, additional facilities will be required to accommodate drainage flows. The City is currently studying the impacts of development on the drainage system and will make recommendations for alleviating drainage problems.
>
> The Auburn Ravine drainage, which includes the Dairy Road, Lincoln Way, and Brewery Lane tributaries, has been studied to identify existing deficiencies and recommend improvements and mitigation measures for new development.
>
> The Old Town Drainage Study investigated the Lincoln Way and Brewery Lane tributaries and made recommendations for improvements to accommodate the 100 year flood. The Dairy Road Watershed Master Plan studied Auburn Ravine from Highway 49 upstream to Luther Road and made recommendations to mitigate impacts from new development.
>
> The analysis conducted for the Dairy Road watershed concludes that the existing facilities are inadequate to accommodate the 100 year flood flow. However, improvements to eliminate flooding problems are prohibitively expensive. Therefore, the City should require detention basins which will mitigate impacts of new development.
>
> The City of Auburn has adopted the Placer County Flood Control and Water conservation District's Stormwater Management Manual. The purpose of this manual is to provide consistent, specific guidance and requirements for stormwater management, including regulation of the development process, to achieve stormwater management objectives. The manual presents policy guidelines, and specific criteria for the development and management of natural resources, facilities and infrastructure for stormwater management.

As indicated in the above excerpt, the City currently has a practice of requiring stormwater detention to prevent worsening of existing flooding. This approach is adequate to avoid the direct effects of the General Plan on flooding and should be incorporated into Plan policies to support continued implementation. However, one potentially significant indirect impact remains: the exposure of increased numbers of people to those flood hazards which now exist. This hazard basically consists of blockage of streets for emergency access during a flooding event. Blocking of access for emergency vehicles may or may not occur during any given flood, but the presence of the risk is regarded as significant. The "Dairy Road Watershed Master Plan" and the "Old Town Drainage Study" identify alternative methods of correcting the existing flooding problems, but these have not been explicitly targeted for implementation in the Draft General Plan. However, the City has selected one of the Old Town drainage system improvement alternatives (#1) and h

included a first phase of those improvements (Brewery Road drainage) in its 1993 capital improvement program (Richard Guillen, Personal Communication, 1/20/93.)

Based upon the above factors, it appears that existing flooding problems within City Limits will be corrected over time — thus, a short-term risk of exposure of increasing numbers of people to flooding hazard will take place.

**Flooding in the Proposed Sphere of Influence** ~ As shown in Figure 7-2 and Table 7-4, buildout of the Proposed Sphere of Influence has the potential to worsen existing flooding conditions in approximately 21 locations. (This is based upon buildout under the County's Auburn/Bowman Community Plan). Thirteen of these locations are in the Existing Sphere of Influence.

New flooding problems are created at five locations in the Proposed Sphere of Influence, two of which are in the Existing Sphere of Influence. Two additional newly-created flooding problems are just outside, and west, of the Proposed Sphere of Influence. It should be understood that a problem is called newly-created if flooding of a given intensity of development causes flooding to occur during smaller storms than those storms now creating flooding. For example, the Wise Road crossing of Auburn Ravine currently floods during the 25-year storm, but with development will also flood during a 10-year event. This is considered a newly-created problem in the context of this EIR.

The seriousness of these overtopping events will vary based on the amount of the overtopping and the degree to which it will damage roads or affect traffic on the roads. According to James M. Montgomery, Consulting Engineers, Inc., overtopping alone does not necessarily mean that damage will occur to the road surface or structure itself, but it does mean that traffic on the roadway, including emergency traffic, may be severely impeded creating a serious safety hazard (Auburn/Bowman Community Plan Hydrology Study, July 1992, p. 3-3). This problem could be serious on any roadway, depending on the circumstances surrounding the flooding event. The problem is most obvious where sole access points are blocked; this occurs primarily in the outlying areas of the Proposed Sphere of Influence. For the 100 year flood event, these are illustrated in Table 7-5.

## Table 7-4
## BRIDGE AND CULVERT OVERTOPPING LOCATIONS IN THE SPHERE OF INFLUENCE REPORTED IN THE AUBURN/BOWMAN COMMUNITY PLAN EIR

| Crossing No. | Stream | Crossing | Crossing Capacity (CFS) | 2 Year | | 10 Year | | 25 Year | | 100 Year | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Present | Future | Present | Future | Present | Future | Present | Future |
| [23][5] | Dry Creek | Hwy 49 (State) | 8125 | | | | | | | | |
| 28[6] | | Dry Creek Road | 2312 | | | | | | | | |
| 29[6] | | Twin Pines Tr (pvt) | 200 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 30[6] | | Haines Road | 1100 | | | | | ✓ | ✓ | ✓ | ✓ |
| [36][5] | Dry Cr Trib #1 | Dry Creek Rd | 15 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 40[5] | Dry Cr Trib #5 | Joeger Rd | 2625 | | | | | | | | |
| [43] | Dry Cr Trib #6 | Joeger Rd | 45 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 45 | Rock Creek | Joeger Rd | 3860 | | | | | | | | |
| [46] | | Sherwood Wy | 977 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 47 | | Dry Cr Rd | 2387 | | | | | | | | |
| [48] | | Richardson Rd | 696 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| [49] | | Hwy 49 (State) | 1368 | | | | | | ✓* | ✓ | ✓ |
| [50] | | Rock Cr Rd | 290 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 53 | | Bell Rd | 1346 | | | | | | | ✓ | ✓ |
| [54] | | New Airport Rd | 405 | | | | | | | | |
| 55 | | Crystal Springs Rd | 602 | | | | | | | | |
| 57 | | Creekview Ct | 450 | | | | | | | | |
| [60][5] | Rock Cr Trib#2 | New Airport Rd | 25 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| [61][5] | | Bell Rd | 185 | | | | | | | ✓ | ✓ |
| [62] | Rock Cr Trib#3 | Locksley Ln | 30 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| [63] | Rock Cr Trib#4 | Rock Cr Rd | 105 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 64 | | Bell Rd | | | | | | | | | |
| 65[6] | North Ravine | Wise Rd | 3730 | | | | | | ✓* | ✓ | ✓ |
| [66][7] | | Warren Wy (Pvt) | 2327 | | | | | | | | |

Abbreviations
abd Abandoned
Pvt Private
R. River
Rav Ravine

Notes
1 Checks in the storm columns represent situations where the drainage structures are exceeded.
2 Asterisks represent overtopping created by Plan buildout.
3 Underlined crossings indicate locations where existing flooding conditions are worsened by the County's Community Plan buildout (100 yr event)
4 Enclosed □ numbers indicate all locations impacted by Plan buildout.
5 Located in Existing Sphere of Influenc SOI) but not in Proposed SOI.
6 Located outside of Existing SOI but Proposed SOI
7 Located outside of Existing and Propo OI.

| Crossing No. | Stream | Crossing | Crossing Capacity (CFS) | 2 Year | | 10 Year | | 25 Year | | 100 Year | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Present | Future | Present | Future | Present | Future | Present | Future |
| 67[7] | | Calnick Rd (Pvt) | 1800 | | | | √* | √ | √ | √ | √ |
| 70[6] | | Millertown Rd | 1172 | | | √ | √ | √ | √ | √ | √ |
| 71[6] | | Mt Vernon Rd | 2169 | | | | | | | | √* |
| 72[6] | | Harris Rd (Pvt) | 90 | | √* | √ | √ | √ | √ | √ | √ |
| 73[6] | | VistaRoble Rd(Pvt) | 228 | | | √ | √ | √ | √ | √ | √ |
| 74 | | Atwood Rd | 135 | | | | | | | | |
| 75 | N.Rav.Trib #1 | Kemper Rd (Pvt) | 8 | √ | √ | √ | √ | √ | √ | √ | √ |
| 76 | N.Rav.Trib #2 | HiddenOaks Ln(Pvt) | | | | | | | | | |
| 78 | | Hwy 49 (State) | 144 | | | √ | √ | √ | √ | √ | √ |
| 79 | | Pear Rd (Pvt) | 2 | √ | √ | √ | √ | √ | √ | √ | √ |
| 80[6] | N.Rav.Trib #3 | Millertown Rd | 60 | √ | √ | √ | √ | √ | √ | √ | √ |
| 81 | | Mt Vernon Rd | 100 | | | √ | √ | √ | √ | √ | √ |
| 82[5] | N.Rav.Trib #4 | Millertown Rd | 7 | √ | √ | √ | √ | √ | √ | √ | √ |
| 83[6] | | Bar Ranch Rd (Pvt) | 5 | √ | √ | √ | √ | √ | √ | √ | √ |
| 85[6] | Auburn Ravine | N.Ravine Confluence | | | | | √* | √ | √ | √ | √ |
| 86 | | Wise Rd | 2400 | | | | | | | √ | √ |
| 87 | | Ophir Rd | 3600 | | | | | | | | |
| 88 | | Ophir Rd | 6000 | | | | | | | | |
| 89 | | Forgotten Rd (abd) | 1000 | √ | √ | √ | √ | √ | √ | √ | √ |
| 93 | Dutch Ravine | Auburn-Folsom Rd | 175 | | | | | | | | |
| 94[6] | Mormon Ravine | Shirland Rd | 65 | | | | | | | | |
| 95[6] | Mormon R.Trib | No Name Rd | 18 | √ | √ | √ | √ | √ | √ | √ | √ |
| 96 | | Andregg Rd | 35 | √ | √ | √ | √ | √ | √ | √ | √ |
| 97 | Amer.R.Trib #1 | Hwy 49 (State) | 120 | | | √ | √ | √ | √ | √ | √ |
| 98 | Amer.R.Trib #2 | Hwy 49 (State) | 25 | √ | √ | √ | √ | √ | √ | √ | √ |
| 99[6] | DeadmanCanyon | Joeger Rd | 270 | | | | √* | √ | √ | √ | √ |
| 100[6] | | Oak Creek Ct | 300 | | | | | | | | |

Abbreviations
abd Abandoned
Pvt Private
R. River
Rav Ravine

Notes
1 Checks in the storm columns represent situations where the drainage structure capacities are exceeded.
2 Asterisks represent overtopping created by Plan buildout.
3 Underlined crossings indicate locations where existing flooding conditions are worsened by the County's Community Plan buildout (100 yr event)
4 Enclosed □ numbers indicate all locations impacted by Plan buildout.
5 Located in Existing Sphere of Influence (SOI) but not in Proposed SOI additions.
6 Located outside of Existing SOI but within Proposed SOI additions.
7 Located outside of Existing and Proposed SOI additions.

**Table 7-5**
**PROBLEM ACCESS ROADS IN SPHERE OF INFLUENCE**

Twin Pines Tr (private road) crossing Dry Creek
Sherwood Way crossing Rock Creek
Bar Ranch Rd (private road) crossing No. Ravine Tributary #4

As shown above, two of the three problem access roads are private.

The City of Auburn Goals, Policies, Implementation Measures, and standard procedures addressing flooding, cited above under "Flooding Within City Limits", will apply to the Sphere of Influence when annexed. Prior to annexation, it is possible that the County's proposed capital improvement program will correct the drainage structure deficiencies prior to annexation, but this is not assured. The City's Draft General Plan recommends capital improvement programs for public facilities, but without specifics on funding, drainage improvements in the Sphere of Influence cannot be assured and thus flooding impacts have the potential to be significant for the reasons described under "Flooding Within City Limits".

Conclusion: Based upon the criteria and analysis above, avoidance of significant future structural flooding is likely though not completely assured due to possible difficulties in funding methods. Also, short-term exposure of increased numbers of residents to flooding hazards will occur.

2. **Impacts of proposed bridge and culvert improvements.** The riparian habitat impacts associated with the bridge and culvert improvements are anticipated to be generally minor. Small areas of riparian vegetation immediately adjacent to the structures will be damaged by construction activities. Where this damage is more than a few hundred square feet in size or involves trees or special plants or animals impacts could be significant. It is anticipated that these impacts could be avoided through individual site review by biologists and special construction and/or restoration techniques.

Conclusion: Based upon the above criteria and analysis, the impacts of proposed bridge and culvert improvements will be significant and mitigatable.

3. **Increases in stormwater runoff and flooding in floodplains.** The existing floodplains for the streams of the Plan area are relatively narrow. According to the Dairy Road Watershed Master Plan, some residences in that part of the City are projected to flood under future conditions (page ii). According to the Auburn/Bowman Community Plan Hydrology Study (p. 3-30) the increase in flood flows from the planned land uses in the Sphere of Influence does not significantly change the area where problems are experienced, though some additional structures may be impacted. Since the exact number and type of these structures have not been determined, there is some potential for significant impacts to occur.

Conclusion: Based upon the discussion above it appears that the effects of flooding in floodplains may be significant. Mitigation may be possible, but this is not assured.

4. **Increases in stormwater runoff and flooding on canals.** A number of canals run through the Plan area, both within City Limits and in the Sphere of Influence. Concerns regarding stormflows and water quality in Sphere of Influence canals are evaluated in the Auburn/Bowman Community Plan Hydrology Study. The conclusions of that study apply to canals in both the Sphere of Influence and the City itself. According to the Study, future land uses have the potential to increase stormwater runoff into canals increasing the potential for damage to canals and unanticipated spills. The precise location and extent of damage and spills cannot be predicted. To a large extent, this problem will be offset by the recommended local on-site stormwater detention structures for new development (p. 5-9). The Hydrology Study also recommends the following methods of protecting the canals form direct new sources of runoff (pp. 5-11 to 5-12):

> **Canal Protection**
>
> As discussed in previous sections there are numerous canals in the study area that supply water for both municipal and agricultural purposes. These canals are owned and operated by either Placer County Water Agency (PCWA), Nevada Irrigation District (NID), or Pacific Gas and Electric Company (PG&E). The canals range in size from small unlined ditches with capacities of less than five cubic feet per second (cfs) to the Wise Canal which has a capacity exceeding 500 cfs. The protection of these canals from surface runoff is of importance due to water quality concerns as well as the potential of canal damage due to flooding.
>
> The various methods available for canal protection include: (1) land use controls, (2) canal encasement, and (3) structures such as interceptor ditches to prevent surface runoff from entering the canals.
>
> **Land Use Controls.** Land use controls may be used to protect canals by preventing the building of structures such as roads, buildings or parking lots directly adjacent to an open canal. Structures such as these may cause an increase into the surface water runoff into the canals as well as an increase in pollutant loads entering the canals. Hence, by limiting commercial and urban development directly adjacent to the canals, the water quality and flooding impacts on the canals from development in the study area can be reduced.
>
> **Canal Encasement.** Encasing all of the canals in the study area is perhaps the best method available to protect the canal water quality and to reduce the impact of flooding on the conveyance and spill structures. However, encasing all of the canals in the study area is not feasible due to the high costs. For example, the total costs for encasing all canals except the Wise Canal is estimated to be approximately $30 million. This estimate was based on utilizing reinforced concrete pipes sized to carry with the existing canal capacities at an average slope of 0.2%
>
> While canal encasement may not be a realistic option on a regional scale, it is a viable option for canal protection on a local scale. For instance, in areas where new development may impact an existing canal, the protection of the canal from the effects of the new development could be accomplished by encasing the canal in the area of the development. As new developments occur, the canals would be

encased where protection is needed most. Also, the canals would not need to be encased in the rural areas where the impacts of the land use changes on the canals are minimal (i.e. conversion of agricultural land to rural estates). Current PCWA, NID and PG&E policy requaires that developers incase canals that border or cross new developments.

**Interceptor Ditches, Diversion Structures.** Another method available for localized protection of canals is to construct interceptor ditches or other division structures such that runoff from a developed area cannot flow into an open canal. The diverted runoff could be routed to a storm drain, or routed under or over the canal to an existing drainage. By requiring new developments to provide this localized protection, this option may also be an effective method in protecting canals from water quality problems associated with new Development.

These recommendations have not been incorporated into the City's Draft General Plan, and no other means are outlined in the Plan for addressing canal issues.

Conclusion: Based upon the above criteria and analysis, the impacts of stormwater on canals have the potential to be significant and mitigatable.

5. **Impacts of regional downstream flooding.** In addition to the local issues of Plan area culvert, bridge, and channel inadequacies addressed above, is the issue of flooding downstream of the Plan area. The City's practice of requiring stormwater detention in new developments will help avoid contributions to existing downstream flood flows. However, this presumes that complete detention is feasible throughout the Sphere of Influence, a concept which was not made part of the County's Hydrology Study, as described in the following excerpt from that document (p. 6-7).

> ... The most significant mitigation produced by local detention occurs in the Rock Creek and North Ravine watersheds. In the Rock Creek watershed the 100-year peak flow increases by approximately 22% (1796 cfs to 2205 cfs) with the change of existing to future land use conditions. However, with the implementation of local detention in the watershed, the 100-year peak flows for future conditions are reduced to 1879 cfs (less than a 5% increase in flows over present conditions). In the North Ravine watershed the future 100-year peak flow (without local detention is approximately 3241 cfs, or an 8% increase over present conditions. With the implementation of local detention in the recommended areas, the future 100-year flow is reduced to within 1% of present conditions.
>
> In the Orr Creek and Dry Creek watersheds the 100-year future peak flows (without local detention) do not significant increase from present peak flows (an increase of less than 3% in each watershed). However, with the limited local detention that is recommended in each of the watersheds, the 100-year future peak flows can be reduced to the present levels in the Orr Creek watershed and within 2% of the present levels in the Dry Creek watershed.

The County Flood Control District is currently investigating the possibility of regional detention facility at the confluence of Coon Creek, Dry Creek Auburn Ravine and Pleasant Grove Creek. A Master Plan of the contributing watershed has been completed which outlines alternative flood control scenarios, but no specific proposal has been approved as funded (Tim Nash, Associate Engineer, Placer County Flood Control and Water Conservation District, personal communication, 6/26/92).

Conclusion: Based upon the above criteria and analysis, the buildout of the Plan area may contribute to significant downstream flooding impacts. These impacts appear to be mitigatable with a regional detention facility, but this mitigation is not assured because no plans and no funding proposals are in place.

6. **Impacts of detention facilities.** Four primary types of impacts can occur from detention facilities: Habitat destruction, hazard to toddlers, mosquito breeding, and hazardous waste accumulation. Small areas of habitat typically must be destroyed to create a detention basin. This habitat may either be upland or wetland; basins in wetland areas are often chosen because convenient stormwater collection locations are often in swales or stream channels. However, it is possible to design the stormwater collection system in such a way as to allow the basins to be placed outside of the wet drainages. This will not necessarily ensure that habitat impacts will not occur, because some other sensitive habitat type or special species could be affected. However, the latter impact could typically be avoided through biological surveys and appropriate design. Wetland creation can also occur as part of the basin design as a wetland mitigation alternative.

   The hazard to toddlers occurs when detention basins are placed within toddling distance of homes and are unprotected by fences. For detention basins the likelihood of an accident is reduced by the fact that water is present only during and shortly after a storm event. This impact is typically avoided in project design by the placement of low fences around the basins and other measures. These measures are included in this document as part of the General Plan mitigation measures.

   Mosquitos can become a nuisance and even a health concern if improperly designed detention basins retain water long enough to become stagnant. A basin design which adequately flushes itself and regular maintenance can avoid mosquito problems.

   An additional potential impact which may result from the utilization of detention basins is the accumulation of metals, oils and greases, and other hazardous substances. This impact can be avoided through soils testing and proper disposal of sediments removed during regular maintenance and classified as hazardous.

   Conclusion: The problems of habitat destruction, hazard to toddlers, mosquito breeding and hazardous materials accumulation are potentially significant impacts which can be avoided by implementing the measures contained in this document.

7. **Degradation of surface waters.** The following is a list of the types of non-point source pollutants that are, and will continue to be, a concern in the Plan area:

- Nutrients
- Oxygen Demand
- Oil and Grease
- Trace Metals
- Toxic Chemicals
- Bacteria

Increased urbanization of the Plan area will increase the amounts of these pollutants in the stormwater. The Nationwide Urban Runoff Program (NURP) monitored over 300 runoff events in the Washington D.C. area and conducted other studies in other locations throughout the nation, suburban and urban. The results, shown while not completely representative of Auburn, provide an indication of how pollutant levels change with urbanization (see Table 7-6).

**Table 7-6**
**AVERAGE FLOW-WEIGHTED CONCENTRATIONS OF POLLUTANTS FROM METROPOLITAN WASHINGTON NURP STUDY (1980-81)**

| Pollutant | Undeveloped Area (mg/l) | New Suburban Nurp Sites (mg/l) | Older Urban Areas (mg/l) | National Nurp Stdy Average (mg/l) |
|---|---|---|---|---|
| Phosphorus | | | | |
| Total | 0.15 | 0.26 | 1.08 | 0.46 |
| Ortho | 0.02 | 0.12 | 0.26 | – |
| Soluble | 0.04 | 0.16 | – | 0.16 |
| Organic | 0.11 | 0.1 | 0.82 | 0.13 |
| Nitrogen | | | | |
| Total | 0.78 | 2 | 13.6 | 3.31 |
| Nitrate | 0.17 | 0.48 | 8.9 | 0.96 |
| Ammonia | 0.07 | 0.26 | 1.1 | – |
| Organic | 0.54 | 1.25 | – | – |
| TKN | 0.61 | 1.51 | 7.2 | 2.35 |
| COD | >40.0 | 35.6 | 16.3 | 90.8 |
| BOD (5-day) | – | 5.1 | – | 11.9 |
| Metals | | | | |
| Zinc | – | 0.037 | 0.397 | 0.176 |
| Lead | – | 0.018 | 0.389 | 0.18 |
| Copper | – | – | 0.105 | 0.047 |

**Water quality degradation within City limits** – The most intensive sources of non-point discharge in cities tend to be associated with the more intensive impervious surfaces of commercial, industrial, and high intensity urban uses. Approximately 300 acres of these high intensity urban uses are currently present within City Limits, not including the Airport (this includes High Density Residential, Commercial, and Industrial). The General Plan designates an additional 384 acres of these uses within City Limits, not includir

the airport (this includes the uses cited above, plus the Mixed Use). This approximately doubling of high intensity uses does not necessarily mean a doubling of non-point source discharge because of the generally lower intensities and the evolving water quality measures normally required of new developments. (Compare "New Suburban NURP Sites" to "Older Urban Areas" in Table 7-6.)

Another factor which lessens the severity of increasing non-point source pollutants is a projected improvement in the quality of water released from the City's Sewage Treatment Plant. This projected improvement is described in the following excerpt from the "Auburn Waste Water Treatment Plant Facility Expansion Master Plan EIR" (QUAD, February, 1992), p. 3-19):

- **Impact #3.2-2:** Alternatives 1 and 2 will affect water quality in Auburn Ravine Creek. However, due to the addition of post-secondary treatment processes and provision for extreme wet weather flow storage facilities, most water quality effects with respect to Auburn Ravine Creek outfall will be beneficial. (There is a potential effect of increased turbidity and siltation from erosion associated with construction of the upgraded facility under Alternatives 1 and 2; mitigation of these effects is provided for above in Section 3.1). Outfall will not bypass treatment processes in peak or extreme wet water conditions as they occasionally do at the current facility (although, thus far, no violations of CVRWQCB-imposed standards have occurred). Design criteria are based on conservative estimates of maximum extreme weather flows to assure that bypass will not occur during extreme wet weather conditions. Outfall will have lower than present BOD, TSS, and probably will involve ammonia removal (which will reduce the potential for algal growth), and potentially, lower turbidity depending on effluent standards imposed in the new discharge permit.

  **Conclusion:** Outfall water quality effects under Alternatives 1 and 2 will be beneficial.

In spite of these offsetting factors, the large amount of increase in high intensity uses in one drainage basin suggest that water quality impacts could be significant.

The General Plan contains the following Goal, Policy, and Implementation Measures related to water quality (Table 7-7):

**Table 7-7**
**DRAFT AUBURN GENERAL PLAN**
**GOALS, POLICIES & IMPLEMENTATION MEASURES**
**RELATED TO WATER QUALITY**

**Goal 3 Minimize hazard to public health, safety, and welfare resulting from natural and man-made hazards.**

Policy 3.2 Continue to encourage and support the enforcement of state and federal environmental and pollution control laws by assisting state and federal agencies in the control of hazardous wastes, landfills, air pollution, and other issues.

E. The City shall review all new development proposals for conformance to standards for environmental protection, air pollution control, water quality, and hazardous waste disposal.

**Responsibility:** Community Development, Public Works, Fire, Police
**Time Frame:** Ongoing
**Related Policy:** 3.2, 3.3, 3.4, 3.5, 3.6

While the above provisions set a broad direction for water quality protection, specifics are lacking on how this might be accomplished. The Mitigation Measures section outlines techniques to ensure the avoidance of significant impacts.

**Water Quality Degradation in the Sphere of Influence** – The following excerpt from the Auburn/Bowman Community Plan Hydrology Study describes potential water quality impacts in each watershed (pp. 4-11 to 4-12) of the surrounding unincorporated area, including the Sphere of Influence. The comments related to the Orr Creek watershed and the north part of the Dry Creek watershed do not apply to the City's General Plan because they are outside of the Sphere of Influence. Additionally the precise amounts of land use changes are not applicable because they relate directly to County designations. The text nevertheless generally describes the anticipated water quality effects in the Sphere of Influence.

> **Orr Creek and Dry Creek Watersheds.** The present land use in the Orr Creek and Dry Creek watersheds is primarily rural residential, agricultural, and open space. There is, however, a small amount of residential and commercial development in the Dry Creek watershed near the Highway 49 corridor. The future land use conditions in these watersheds calls for the conversion of approximately 25% of the existing open space and agricultural land to rural estates and rural residences. Only a small amount of land (one tenth of a square mile in the Dry Creek watershed) is designated for residential development and there is no future commercial development in this area.

Due to the increase in rural residences in these watersheds there is the potential for increased pollutant loads of hydrocarbons from automobiles, nutrients from landscaping activities and other chemicals from pesticides and herbicides. In addition as open space and agricultural areas are converted to rural lots, there may be an increase in livestock and other ranch animals in these watersheds. This may increase the pollutant loads (ie, bacteria) into the canals and streams from animal waste transported by stormwater runoff.

**Rock Creek Watershed.** The Rock Creek watershed presently has a wide variety of land uses. The lower watershed (below Rock Creek Lake) is primarily commercial (along the Highway 49 corridor) and residential whereas the upper watershed has larger amounts of open space along with limited residential and rural development. In addition, the Auburn Airport and associated business park are also located in the upper Rock Creek watershed. Future land use changes in the Rock Creek watershed include continued commercial development in the lower watershed and commercial and residential development in the upper areas of the watershed. Over 50% of the existing open space in the upper watershed will be developed.

The future development in the Rock Creek watershed has the potential for adverse impacts on the water quality of the canals, streams and Rock Creek Reservoir primarily from the urban and commercial land uses. The potential impacts include increased hydrocarbon levels from increased automobile traffic, increased nutrients from landscaping activities, bacteria from animal waste and increases in other pollutants associated with urban runoff.

**Auburn Ravine/North Ravine Watershed.** The present land use of the Auburn Ravine/North Ravine watershed (excluding the City of Auburn) is primarily rural residential and agricultural. There is limited commercial and residential development in the watershed, mostly in the areas adjacent to the Highway 49 corridor. Future land use changes in the area calls for conversion of all of the agricultural areas and a portion of the open space areas to rural lots. There is (sic) no planned changes to residential or commercial land uses in this area.

The future water quality impacts from land use changes in the Auburn/North Ravine watershed should be similar to that of Orr Creek and Dry Creek watersheds. There may be increases in pollutant loads associated with the rural development (ie, nutrients, hydrocarbons, bacteria).

**Remaining Watersheds.** The remaining watersheds in the Auburn/ Bowman Community Plan area (Bear River, American River, Deadman Canyon, Dutch Ravine and Mormon Ravine) are presently all rural, agricultural and open space. Future land use changes in these areas are minimal with the primary changes being the conversion of a portion of the existing agricultural land and open space to rural lots. As with other watersheds in the study area, the future water quality impacts on the streams and canals will primarily result from the rural development and the associated pollutants (nutrients, hydrocarbons, bacterial, etc.).

The use of surface water in each of these watersheds varies from aquatic habitat to domestic consumption. Unauthorized use of canal water for domestic consumption may still occur in some areas.

A more formal domestic use of surface water occurs in the Rock Creek watershed. The water in Rock Creek Reservoir is treated and distributed by NID as drinking water. Potential water quality impacts of urbanization in the Rock Creek Watershed have been described in the previous EIRs as significant and unmitigatable, largely due to the possible disposal of household hazardous wastes, such as herbicides pesticides, solvents (Planning Concepts, "Lotus Ridge EIR" — Name subsequently changed to Princeton Club Estates", 1986, pp. 57-60).

The following passage from the above-cited EIR explains the difficulty of removing pollutants once they are in the Reservoir:

> The N.I.D. water treatment plant is designed to remove most pollutants; sedimentation, sands and flocculation procedures remove most suspended matter, and chlorination kills bacterial contaminants. These processes can remove most urban pollutants. However, there are some chemicals, particularly complex hydrocarbons, such as types of pesticides and herbicides, which will not be completely removed. An increase in concentrations of these chemicals may require modification of the N.I.D. treatment plant.
>
> The State Department of Public Health publishes "Reliability Standards" for the treatment and testing of water from different watersheds. Briefly, there are three classes of watersheds:
>
> - Class I – There are few if any houses, and land uses are controlled;
> - Class II – There are some houses, and land uses are controlled;
> - Class III – The watershed is developed with homes and other uses.

Each class has increasingly restrictive treatment and testing requirements. The Rock Creek Watershed is currently Class I, urbanizing toward Class II, and when it reaches this class, water quality testing will have to be done every 6 months instead of the current two year interval. N.I.D. is concerned that, as development occurs in the basin, pollutants will increase to the point where State and Federal water quality standards are exceeded for one or more constituents. This could require that the treatment plant undergo an expensive upgrading, perhaps including the installation of carbon filters, which are costly to maintain.

Additional pollution sources within the watershed include the Auburn Airport industrial area and the large block of industrial use in the northeast quadrant of Bell Road and New Airport Road. Traditional point source industries have not located in this area and are not anticipated. However, the presence of manufacturing establishments heightens the concern about non-point discharge of hazardous substances. The City has required uses at the industrial area to install runoff pre-treatment vaults and there is a Rock Creek Reservoir mitigation fee in place to pay for the proposed bypass channel described below. These practices substantially lessen the potential for impacts. However, the possibility of spills will always exist. Additionally, unauthorized discharges/ spills from residential areas are even more difficult to control.

The above considerations make the Rock Creek Watershed the most sensitive of those in the Plan area in terms of water quality; the American River is similar in that its waters are used for domestic consumption (after reaching Folsom Lake). However, the American River is somewhat different in that the dilution effect in Folsom Lake far exceeds that of Rock Creek Reservoir. However, significant impacts are possible in all of the area watersheds even on the basis of aquatic habitat considerations alone.

The County's Auburn/Bowman Community Plan contains several goals and policies calling for the protection of water quality — the use of stream set-backs and Best Management Practices (BMP) are recommended as are a combination of sedimentation basins and a Rock Creek Reservoir cut-off channel to protect water quality in the Reservoir. The Hydrology Study notes that the sedimentation basins recommended to protect Rock Creek Reservoir will remove 70% of the suspended solids that are of the size of very fine sand or larger. Additionally the bypass channel will convey all of the two-year runoff event and the first flush of the larger events around the Reservoir. Overall, this is an effective program. However, those constituents of most concern, the hydrocarbons, are the least likely to be addressed by the system.

The issue of canal water pollution is another issue in the Plan area. The Auburn/Bowman Community Plan Hydrology Study recommends a number of measures to protect canal water including Best Management Practices, canal encasement, and land use controls. Canal encasement will be effective to protect canal water from future urban runoff; land use controls will be partially effective, but animal wastes from undeveloped lands and urban runoff from upstream areas during large storm events will still be problems.

In less sensitive areas, Best Management Practices have the potential to effectively mitigate water quality impacts.

Conclusion: Based upon the above criteria and analysis, general water quality impacts within both the City Limits and the Sphere of Influence will be significant but mitigatable through BMP's and other measures recommended. However, impacts on the Rock Creek Reservoir will be significant and unmitigatable.

8. **Impacts of recommended water quality protection facilities.** The primary impact of the recommended water quality facilities is potential destruction of wetland habitat. The comments regarding detention basins under impact #6 apply to the BMPs involving detention — impacts are significant and avoidable with regard to wetland impacts, mosquito breeding, hazards to toddlers and hazardous materials accumulations. This conclusion may not apply to the Rock Creek Reservoir protection facilities being considered by the County; the recommended sedimentation basins have not been sized or located, making the avoidability of impacts impossible to predict. The Reservoir Bypass Channel would cross riparian corridors in two to three locations — significant ling-term, unavoidable impacts may occur from disruption of the riparian forest which lines the large perennial stream entering the Reservoir from the east.

Conclusion: Based upon the above criteria and analysis, the impacts of water quality protection measures will generally be significant and mitigatable. Those of the Rock Creek Reservoir protection measures will be significant and unmitigatable, but are not part of the proposed City of Auburn General Plan.

9. **Impacts on groundwater quality.** As described in the Setting section, the groundwater of the Plan area is found in surface fractures and cracks in bedrock. In these areas there is potential for surface contamination of the groundwater. In urban areas, the runoff constituents discussed above (under Impact #7) would be of principal concern. In rural areas, coliform, fertilizers, and pesticides would have the potential to affect both fractured rock groundwater and shallow "perched" groundwater. Some of the Best Management Practices discussed above will address groundwater contamination, but mitigation cannot be completely assured without knowing the specifics of each situation.

Some septic systems may remain in the Sphere of Influence, raising the issue of excessive nitrate concentrations and the resultant health risk (notably methemoglobinemia in infants). However, the City has the ability to require connection to sewer systems if health problems occur from septic systems.

Conclusion: Based upon the above criteria and analysis, impacts on groundwater quality have the potential to be significant and unmitigable.

10. **Effects of urbanization on groundwater recharge.** Buildout under the proposed Plan will result in increased impervious surfaces and possible decrease in groundwater recharge. The extent of this effect will depend upon the location of groundwater bearing bedrock fractures in relationship to permeable soil conditions and potential impervious surfaces. In general, the extent of the impervious surfaces does not appear to be sufficient to substantially lower groundwater levels, particularly since the area's streams are planned for protection.

Conclusion: Based upon the above criteria and analysis, impacts to groundwater recharge will be less than significant.

11. **Cumulative effects of joint City and County development — considered above.** The combination of drainage and water quality impacts described above constitute cumulative impacts. These impacts are significant and unmitigable for the various conditions described above.

Conclusion: Based on the impact evaluation criteria and discussion, as in the case of the Community Plan area impacts, cumulative City/County effects will be significant because avoidance measures are not completely assured.

*The following discussion from page Final-54 resulted from changes made by the Planning Commission to the draft Plan:*

*Ref: Final EIR, p.54*

*The land use changes generally represent minor increases in density and changes in intensity on acreage which are relatively small in the context of the Plan area. These changes may slightly alter the culvert overtopping estimates presented in the DEIR, but the basic conclusion of the DEIR depend on the larger questions of drainage improvement financing and water quality protection feasibility and remain unaltered.*

**Mitigation Measures**

*Ref: Final EIR, p.90*

1a. **Addition of a policy to the General Plan establishing on-site detention or other related facilities** as the City's means of preventing increased flooding within City Limits. The recommendations of the "Dairy Road Watershed Master Plan" or other flood control plans for stormwater detention should be incorporated into the policies of the General Plan along with any other flood control mechanisms the City intends to use.

1b. **No additional measures are available** to assure funding for currently needed drainage improvements within the City. One of the factors complicating funding options is the extent of improvements needed for existing flooding conditions; even if substantial development fees are enacted, approval by existing residents of assessment districts or other funding may not be possible, with the result being added population exposed to flooding. There are no obvious options for avoiding this problem.

Effectiveness of Measure: These measures have the potential to prevent significant flooding problems, but this conclusion cannot be assured for the reasons described.

Implementation: General Plan revision

Mitigation Monitoring: General Plan adoption process

2. **Biological field studies and resulting mitigations for the impacts of proposed bridge and culvert improvements.** Future environmental review of bridge and culvert improvements should include review by qualified biologists, and the resulting recommendations should be incorporated into the project plans.

Effectiveness of Measure: This measure will assure that the environmental review process results in effective mitigation of bridge and culvert improvement impacts.

Implementation: Community Development Department scoping of environmental review for drainage improvements.

Mitigation Monitoring: Environmental review

3. **Levees and floodwalls for any homes or other flood sensitive structures found to be located in the floodplains and funding through user fees, development fees or similar mechanisms.**

Effectiveness of Measure: This measure is not assured since the number and type of impacted structures is unknown and no adopted improvement program has been formulated.

Implementation: Flood Control District

Mitigation Monitoring: On-going Flood Control District efforts

4. **Addition of a policy to the General Plan establishing methods of protection water canals, such as canal encasement, land use controls, and interceptor ditches/diversion structures.** The specific methods needed for canal protection are outlined in the Auburn/Bowman Community Plan Hydrology Study.

Effectiveness of Measure: This measure will be effective in preventing significant effects on canals.

Implementation: General Plan revision

Mitigation Monitoring: General Plan adoption process

5. **Continued efforts by the Placer County Flood Control and Water Conservation District to establish regional stormwater management facilities, including regional detention facilities if necessary.**

Effectiveness of Measure: The feasibility, and thus effectiveness, of this measure is not known.

Implementation: Flood Control District

Mitigation Monitoring: On-going Flood Control District efforts

6. **Required biological surveys, wetland replacement, basin fencing, proper basin drainage and maintenance, and soils testing and proper disposal o sediments to address detention basin and water quality facility effects.**

The following studies and basin design features should be included in the project description submitted for environmental review:

a. **Botanical and biological surveys of areas to be affected by proposed detention basins.**

b. **Recommended measures, such as wetland replacement, to offset impacts on biotic resources.**

c. **Non-visually obtrusive fencing capable of restricting small children from any basins with permanent or semi-permanent standing water.**

d. **Proper basin design and maintenance to prevent the occurrence of stagnant water and mosquito breeding.**

e. **Periodic soils testing of accumulated sediments for hazardous substances and disposal a site approved to receive hazardous materials.**

Effectiveness of Measure: These measures will be effective in preventing the various impacts associated with detention basins.

Implementation: Environmental review.

Mitigation Monitoring: Environmental review.

7.9. **Addition of a policy so that Best Management Practices are required throughout the Plan area and particularly in the upper Rock Creek watershed**

a. Utilize the Auburn/Bowman Community Plan Hydrology Study recommendations as a source of implementation tools for Best Management Practices. A list of the types of BMPs available is provided below (Table 7-8).

**Table 7-8**
**POTENTIAL BEST MANAGEMENT PRACTICES (BMPs) FOR THE AUBURN GENERAL PLAN AREA**

**Rural and Agricultural BMPs**
- Animal Waste Management
- Range and Pasture Management
- Streamside Management Zones
- Agricultural Chemical Management

**Urban and Commercial BMPs**
- Litter Control/Solid Waste Management
- Street Cleaning
- Minimization of Directly Connected Impervious Areas
- Grass-lined or Vegetated Swales
- Public Education
- Filter Strips

- Dry Extended Detention Basins
- Wet Extended Detention Basins
- Constructed Wetlands
- Trapped Catch Basins
- Urban Landscaping
- Water Quality Inlets (Oil/Grit Separators)

**Construction Site BMPs**
- Dike and Berm Controls
- Ditch and Swale Controls
- Sediment Collection
- Land Grading Controls
- Vegetation and Mulching Controls
- Structure Slope Stabilization
- Litter Control/Solid Waste Management

b. In the Rock Creek watershed wet scrubbing of parking areas with a scrubbing/vacuum machine should be added as a BMP. Part of the wet scrubbing requirement should be the proper disposal of the resulting vacuumed wash water since it will contain pollutants.

c. **Adoption of the sedimentation basin/bypass channel approach to protection of Rock Creek Reservoir water quality or comparable means.** On-site artificial wetlands may provide an alternative means of mitigation.

Beyond these changes, no additional measures are available to mitigate surface water pollution and the impacts of recommended water quality protection facilities. However, the Alternatives section discusses the downscaling of land uses in the Rock Creek watershed to limit pollution there.

Effectiveness of Measure: These measures will not be sufficient to lower impacts below the level of significance.

Implementation: General Plan revision

Mitigation Monitoring: N/A

8. **See Measure #6 for measures to avoid impacts of water quality protection facilities.**

9. **See Measure #7 for measures to protect groundwater quality.**

10. **No further measures are necessary** to limit the effects of urbanization on groundwater recharge.

11. **No additional measures are available to the City regarding cumulative City/County impacts beyond those described above.**